Extension Folder 543—1980
Crop Pest Management Series

Herbicide Symptoms in Sunflower

Jeff Coultas, area agent,
crop pest management

Agricultural Extension Service
University of Minnesota

Herbicides sometimes injure sunflower, but diagnosing the injury may be difficult. Weather, soil, diseases, and insects affect crop growth and contribute to sunflower injury from herbicides or induce symptoms similar to herbicide injury. Thus, it is often impossible to find a direct relationship between sunflower injury symptoms and a specific herbicide, or to estimate yield effects.

Most often "herbicide injury" is seen as stunted, malformed, or slow-growing plants and/or plant death. It usually results from errors in application, drift of herbicides from adjacent fields, or residues of herbicides in the soil. Injury patterns in the field may correspond to soil types, equipment movement, prevailing winds, or injury to susceptible weeds in the field. Comparisons of sunflower stands, appearance, and yield between affected and unaffected parts of a field are needed to assess damage.

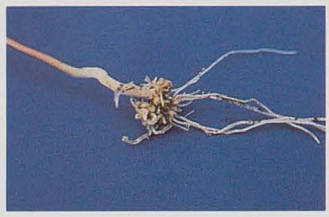
A variety of factors, such as a tall growth habit, large heads, and weak stem, make sunflower susceptible to wind damage during late stages of development (17)**. Sunflower is least tolerant of hail damage during the seedling and bud stages of development. Hail symptoms include callous formation, stem bruising, and defoliation (18).

Injury symptoms pictured in this publication occurred in production fields or were induced by excessive rates of application. The symptoms are representative of a herbicide or group of herbicides, but symptoms may vary considerably, depending on the stage of crop development and growing conditions when the injury occurred.

1. Alachlor. Leaf malformation.

2. Dalapon. Leaf malformation.

3. Chloramben. Root proliferation.



4. Barban. Leaf crinkling, dead areas.

5. Trifluralin. Stunting, root reduction.

6. Trifluralin. Swollen hypocotyl; short, stubby roots.

7. Diclofop. Leaf distortion similar to phenoxy symptoms.

8. Diclofop. Leaf distortion, stunting.

9. Oxyfluorfen. Leaf crinkling, preemergence.

10. Acifluorfen. Leaf malformation, postemergence.

11. Dinoseb. Leaf malformation.

12. Naptalam + dinoseb. Leaf crinkling, drying.

13. 2,4-D, Leaf crinkling.

14. EPTC. Leaf malformation, crinkling.

15. Metribuzin. Leaf yellowing.

16. Difenzoquat. Leaf yellowing.

17. Wind damage.

18. Stem bruising, defoliation—hail damage.

(See descriptions on back)

***Numbers in parentheses refer to the pictures numbered on this page.*

CHEMICAL GROUP AND HERBICIDES	SYMPTOMS
Acetanilides alachlor (Lasso) metolachlor (Dual) propachlor (Ramrod/Bexton)	Acetanilides are absorbed by roots, shoots, and seeds and translocated to all parts of the sunflower plant. Injury symptoms are a shortening of the leaf midvein (1)** or inhibition of early seedling growth.
Aliphatic acids dalapon (Dowpon M, Dalapon 85, Basfapon) TCA	TCA and dalapon are absorbed by leaves and roots and translocated throughout the plant. Symptoms include leaf malformation (2), leaf yellowing or death, and inhibition of root growth. Symptoms develop 7 to 10 days following exposure. Sunflower is semitolerant of dalapon when it is used at normal rates in registered crops.
Benzoics chloramben (Amiben)* dicamba (Banvel)	Chloramben is absorbed by seeds and roots and is not translocated. Chloramben remains in roots of seedlings and causes a proliferation of short, stubby roots, which may result in delayed emergence and stunted topgrowth (3). Injury is observed when sunflower is planted in dry soil and rain leaches the chemical into the seed area before seed germination. Symptoms can be seen one to several weeks after planting. Dicamba is absorbed by roots, stems, and leaves and is translocated in the plant. Dicamba drift has caused leaf malformation, inhibition of root development, and sterile heads. Dicamba symptoms are visible 7 to 10 days after exposure and are evident on the new leaves.
Carbamates barban (Carbyne)*	There is very little translocation of barban. Symptoms include spots of dead tissue and areas of puckering on treated leaves (4). Severe doses may cause some stunting. New growth is not usually affected. Sunflower is usually quite tolerant of barban.
Dinitroanilines dinitramine (Cobex)* fluchloralin (Basalin) pendimethalin (Prowl) profluralin (Tolban)* trifluralin (Treflan)*	Dinitroanilines are absorbed by roots and shoots of emerging sunflower seedlings and are not translocated. These herbicides inhibit lateral root development causing short, stubby roots with enlarged tips, swollen hypocotyls, and stunting of sunflower (5, 6). Injury is observed anytime after seed germination.
Diphenyl ethers acifluorfen (Blazer) bifenox (Modown) diclofop (Hoelon) oxyfluorfen (Goal)	Bifenox and oxyfluorfen are absorbed by emerging shoots of sunflower, while acifluorfen and diclofop are absorbed by leaves. Diphenyl ethers undergo very little translocation in plants. Diclofop causes leaf malformation and stunting (7, 8), which will appear 1 to 3 weeks after exposure. The other diphenyl ethers have contact action, which causes leaf crinkling, malformation, and tissue death (9, 10). Cool, wet conditions and deep planting, which slow seedling emergence, will increase the potential for diphenyl ethers to injure sunflower. Symptoms are visible one to several weeks after planting.
Phenols dinoseb (Dow General, Sinox General, Premerge)	Phenols are absorbed by roots, shoots, and leaves with little or no translocation. Phenols have contact action. Preemergence applications cause injury to roots and leaves (11), while a postemergence application results in leaf drying and death. Injury symptoms are noticeable with a few hours or days after exposure.
naptalam and dinoseb (Dyanap)	Naptalam is absorbed by leaves or roots and translocated to growing points in sunflower. Symptoms include stem twisting and leaf crinkling (12). Dinoseb has contact action, which causes leaf drying and death (12). Symptoms develop within 24 hours after exposure.
Phenoxys 2,4-D MCPA	Phenoxy herbicides are absorbed primarily by plant foliage, but root or stem absorption occurs. The phenoxys are translocated in plants and accumulate in growing points. Sunflower stems become twisted, brittle, branched, and/or develop callous tissue. Leaves develop parallel veins, causing the interveinal tissue to become restricted and crinkled (13). Phenoxy symptoms are apparent within a few hours to several days after exposure and are usually caused by drift when nearby crops are sprayed.
Thicarbamates butylate (Sutan Plus) EPTC (Eptam*, Eradicane) triallate (Far-go) vernolate (Vernam)	Thiocarbamates are absorbed by roots, shoots, and seeds and translocated throughout the plant. They cause enlarged cotyledons, leaf crinkling and malformation, thickened dark green leaf tissue, and delayed seedling emergence (14). Symptoms are visible one to several weeks after planting.
Triazines atrazine (several trade names) cyanazine (Bladex) metribuzin (Sencor/Lexone) simazine (Princep) *and* **Ureas** chlorbromuron (Maloran) chloroxuron (Tenoran) linuron (Lorox)	Triazines are absorbed by roots and leaves. They are translocated from roots to leaves, but there is little movement out of the leaves. Ureas are absorbed by roots with translocations to the leaves. Both triazines and ureas cause yellowing and death of leaves (15). Symptoms appear first on older leaves as marginal yellowing, which progresses inward to the midvein, followed by death of the leaf tissue. Symptoms occur 10 to 21 days after planting.
Unclassified difenzoquat (Avenge)	Difenzoquat is rapidly absorbed by sunflower foliage with little translocation from treated leaves. Symptoms are evident 7 to 10 days after exposure and appear as yellowing and dead areas on treated leaves (16).

**Registered for use in sunflower.*

***Numbers in parentheses refer to the pictures numbered on the reverse side.*

Issued in furtherance of cooperative extension work in agriculture and home economics, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture. Norman A. Brown, Director of Agricultural Extension Service, University of Minnesota, St. Paul, Minnesota 55108. The University of Minnesota, including the Agricultural Extension Service, is committed to the policy that all persons shall have equal access to its programs, facilities, and employment without regard to race, creed, color, sex, national origin, or handicap. 10 cents